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USING ELECTRONIC DATA PROCESSING IN COMMUNITY DEVELOPMENT

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Foreword

This paper was proposed by a committee established by the U.S. Department of Agriculture to help strengthen Extension programs through the use of computer technology in community resource development. The committee included:

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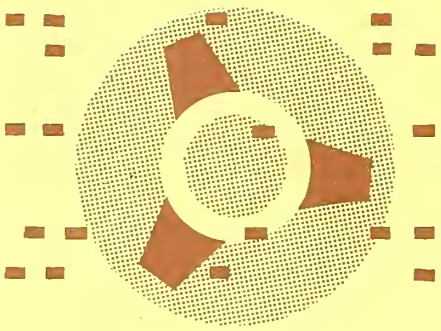

USING ELECTRONIC DATA PROCESSING IN COMMUNITY DEVELOPMENT

Two Presidents of the United States have appointed groups to study rural development. The President's Commission on Rural Poverty produced a significant report, *The People Left Behind*. This was followed by a report by the President's Task Force on Rural Development, *A New Life for the Country*. These studies have pointed up the problems and have resulted in an explicit national policy of rural development.[1]

Current national policy on community development places primary responsibility for local development programs on local leaders. The policy asserts that local leaders should be best able to determine the most appropriate goals and courses of action for their areas. It recognizes that community leaders have made such decisions in the past and can continue to do so.

LOCAL AND NATIONAL GOALS

There is some controversy on whether local solutions to community development problems are relevant to national goals. Can local decisions on any one problem result collectively in an appropriate national policy? In most instances, it appears that local decisions are made in the best interest of the local community without particular regard for national policy.

We need a capability for recognizing the effect of local decisions on national goals, and the effects of alternative actions on explicit policies. As decision making is decentralized, broader dissemination of information and analysis is needed. Centralized decisions require that only a few decision makers be well informed, but as more people participate in the decision making process, they need more information to discharge their responsibilities.

The problems that local decision makers are being asked to pass judgment on are increasing in complexity. Growing populations, advancing technology, and increasing diversity of economic and social activity mean that actions by a local group may affect a wide area.

[1]President Nixon's State of the Union Message, 1970.

EDP IN LOCAL DECISION MAKING

Applying electronic data processing (EDP) to rural development problems will help meet the increasing demand for data and analyses as local groups make more policy and community decisions. Used indiscriminately EDP technology can result in large expenditures by a community with little usable information generated. Used correctly, it can improve the efficiency of the development process.

The computer can extend, expand, and intensify man's mental and physical capabilities. It can magnify man's mental and sensory abilities just as machines have magnified his muscular strength.

It may be a formidable educational task with the public to replace the aura of mystery surrounding computers with realistic knowledge of computer capabilities. As any effective change agent knows, people are slow to accept change until they feel that they are performing the change rather than having it done for them. Information on the uses of computers must be directed toward the real people making up the audience and the real situations they are facing. In community development, leaders must understand what computers can and cannot do, how they operate, their cost, and what changes in personal habits and business procedures computers will bring about.

While it has been suggested that "data are the latest kind of pollution," this is not normally so in most communities. Programs are needed to assist State agencies and State industrial development offices in providing communities with such information. Many larger communities can get this type of information readily, but it is not available in smaller rural communities. Often, the information available is not programmed or analyzed, and comparisons cannot be made easily without the use of computer systems.

Getting Organized to Use EDP

Much advance work needs to be done before implementing community development via the computer. The decision process should begin with establishing community goals. This involves group decision making, but individuals must give their support.

Usually development will encompass more than one community, and this requires regional or area goals. This is difficult because community goals don't necessarily add up to the best goals for the total region, State, or Nation. There must be compromises. Defining community problems is difficult, but must be done carefully or the development process which follows will be handicapped.

Once a community sets its goals and defines the problems, it can examine alternative development strategies. These strategies must be evaluated. Electronic data processing is likely to come into its own in this evaluation phase of the development process.

An economic growth area with its towns and countryside can use EDP programs for decisions much the same way that businesses use them. The elected officials conducting the multi-million dollar business of local political units must use greater precision in determining resource combinations if they are to realize their full development potential. Through EDP, development areas can be programmed so that the optimum use of new resources in relation to existing public and private resources can be determined. Such program development helps local officials allocate public capital expenditures and assists private entrepreneurs to take part in orderly development. The experience of agriculture in applying EDP to decision making in farm management applies directly to the decision making process in rural development.

Few communities can proceed with development plans until they have inventoried the resources at their command. Then, they must assess the development actions that have already taken place, so they can examine the alternatives for solving problems and attaining their goals. If their resource base is limited, regional action may be the only way to go.

Larger communities often have access to large data banks. Analyses can move rapidly, giving them an advantage over their rural counterparts. Rural areas are at a disadvantage because they do not have:

- Easy access to data
- An analysis of the relationships among the various resources of the community
- The data on cost and benefit of various types of improvement either in the private or public sector.

Public Investment in EDP

Community development depends primarily on the economics of private and public investment, plus social and political acceptance of these investments and the ensuing development projects. Any investment project or program will cost capital, time, and energy. These must be considered in relation to returns in profits, increased incomes, improved services, or increased satisfaction. Many costs and returns are difficult to quantify, but values can be placed on them, and analyzed through EDP. The socioeconomic impact of alternative decisions can also be assessed.

The private sector invests to make a profit. Thus, capital investment generates a product or service with a greater value than the resource inputs. Payments to labor and management add to the local economy. If the inputs (such as farm products) are purchased locally for processing, and sold outside the area, an economic impact will result.

Economic investment in the public sector should return value equal to or greater than the cost of the service or facility. This return, for example, might be in the form of monthly water payments, taxes, or satisfaction derived from a well kept park. Local leaders must decide on investments in relation to the longrun goals of their constituents. Often, proposed investments in public facilities do not return all costs in the short run, but will help an area expand the private sector at a later date. Increased income from expanded facilities is often delayed until the population increases enough to pay for it. If the added population does not materialize, the resident population will have added expense. A better information base and analysis can prevent some overinvestments in public sectors and give greater use of underutilized facilities.

Many rural communities have made little or no private or public investment for a long time. They will have difficulty attracting the outside resources they need. They should study possibilities of reorganizing institutions and regionalizing with other communities. They might improve and consolidate local government activities, reexamine the tax base, improve the financial management of the local governmental units, and make better use of resources.

Information Bases

A group wishing to use computer facilities for development will need to establish an information base to provide data to local decision makers. They will need data from local, city, and trade areas that may include several counties.

The data should include information on current employment, unemployment, wage rates, major employers, types of products and services produced, the quantity and source of materials used in manufacturing, and an inventory of products that could be processed locally. It is important to know what skills are available. The types of training programs offered through local vocational technical schools, junior colleges, and universities are important.

Transportation is a primary resource for development purposes. The group should know the number of railroads, trucks, airports, and the transportation time and freight rates to major centers. In some areas navigable waterways and rivers should be considered.

What is the availability and capacity of the power supply, water supply, natural gas, and sewer systems? Also needed is information on the potential for industrial expansion and rates. The type of water supply and sewage disposal plants will often affect the kind of industry or community improvements that can be added without taxing the present structure.

Civic data are needed. This includes the type of local government organization, record of industrial bonds, and industrial levy. Recreation facilities are a resource. There should be information on capacities of public schools and colleges, and the number of students and teachers. Note the existence of a planning and zoning program and zoning ordinances. Are they municipal, township, or county ordinances?

Get data on financial institutions, the present and past tax structure for real estate, personal

property, railroads, and utilities. The city, school, county, and total tax levy is very important. Include the bonded indebtedness for school and city projects throughout the area.

The natural resources of the area, including soils, water, minerals, timber, and agricultural production, are as much a part of development as are urban resources. Data are needed to assess the potential development of each resource.

Information should be compiled for easy retrieval for responsible leaders. It can help them use existing resources to provide more jobs for local people. Smaller communities should combine their data into one system for a development area, for analysis and planning purposes. Given these data, a plant manager can decide whether the area has the resources he needs.

Data from the U.S. census and State offices should be incorporated into any information base system. These data are usually available on tape and can be put into local computer programs.

Data Banks and Retrieval Systems

Data banks and retrieval systems are attracting attention because of their potential for handling large quantities of data and providing quick access for frequent use.

If data need to be retrieved frequently or quickly, to up-date or correct, to analyze, reorganize, recombine, or to select subsets, then a data bank with a retrieval system is useful.

However, establishing a data bank and retrieval system for local data and designed primarily for local use, may be beyond the means of many local communities, towns, counties, or even multi-county areas.

Access to a large-scale computer is the first requirement. Computers are seldom found in a rural area without a major metropolitan center, and it is unlikely that such an area can afford to buy one. However, obtaining remote access to a time-shared computer may be feasible.

A second requirement for a data bank and retrieval system is a staff to assemble the data and prepare it for input to the computer. This requirement is not severe if the data come from an EDP record keeping system, or if the data can be extracted from a regional or national data bank. Otherwise, data collection and preparation are time consuming and expensive.

A third requirement is a computer staff to create the data bank, prepare the retrieval programs, and maintain and operate the system. Again, the severity of this requirement varies. Computer programs do exist to create data banks and retrieve data from them. If existing programs are used, the size of the computer staff would be small (a couple of people). Otherwise a large staff and a great deal of time will be needed.

Local rural areas using but not creating a data bank would have fewer requirements. They would still need access to a computer, but they would not need a staff to assemble and prepare data. The size of the computer staff needed to operate and maintain the system would be much smaller than the staff needed to create the data bank and write the retrieval program.

Another alternative would be to tie into an existing system developed by others, merely adding local data to the data bank. Staff requirements would depend on the amount and type of local data added.

In deciding the feasibility of a data bank and retrieval system, the costs have to be balanced against the value of the output. For local data for local rural areas (particularly small communities) it would seem that the cost is far more than the value of the output. The reasons are: (1) the small amounts of information needed can be obtained easily through traditional means, (2) for data more detailed or frequent than the census, a staff would be required to acquire and prepare the data, an expensive process, and (3) data would be used infrequently.

It is less clear whether the value of local data in an existing system would exceed cost. If the data assembly and preparation costs could be avoided, as it could be for obtaining census data, some selected resource data, or subsets of data from an existing data bank, then it might be worth the cost.

A reasonable goal would be an information system capable of providing specific data, which is manageable and can be effectively used. Computer technology can serve community development decision-making centers beyond its current usage. The establishment of central information systems capable of serving intermediate and local terminals would provide unlimited possibilities for

transmitting data throughout a hierarchy of decision-making centers—from those concerned with broad policy questions to community group decisions.

Applying EDP to Information Needs

The problem determines the kind and amount of information needed for decision making. Masses of unassimilated information at any decision-making center only add confusion. A useful system must provide the right kinds and amounts of data.

Charles C. Holt, in a recent article, outlined some of the shortcomings of the knowledge system available to public decision makers.[2] He pointed out that in areas of governmental activity, problem-oriented research and programmatic research are relatively weak. Further, there are problems of communication, incompatibilities between computers and programming languages, and the costs of relevant data, computer programs, and library services are still very high. In the final analysis, the cost-benefit concept limits information which can be made available.

Daniel Bell said, "Without the organization of information, we can no longer know where we are going, and as an old Talmudic aphorism puts it, 'if you don't know where you are going, any road will take you there.' "[3]

EDP must bring information supplying centers into harmony with decision-making centers.

Information centers should be able to receive, classify, and store data in large quantities, perform extensive analyses, and retrieve and transmit both vertically and horizontally.

Intermediate stations capable of performing both information transmission and decision-making functions are the next step. Their capabilities should include initial data simulation and storage and some basic analyses. They should be able to facilitate the orderly transfer of data from key centers to local terminals. District planning and development offices, State and Federal agency offices, and institutions with multi-county responsibilities might participate in a system at this level.

At the base of the decision-making hierarchy stand the centers which blend ideas and information with action. The information system should link local decision-making units with both intermediate units and the key information centers.

These local terminals should have the capacity to record, to feed raw data into the system, and to request and receive information from other local terminals, intermediate stations, and key centers. Logical users of local terminals are county and municipal governing bodies and public and private groups, agencies, and organizations concerned with community development.

Figure 1 illustrates such a system. It shows relationships between the levels and the flow of data in a State system designed to provide economic and business information for development decision making.

Holt indicated that such information systems may still be virtually useless because of the lack of knowledge of underlying relationships. To be successful, they must be supported by "research on the behavioral relations that are necessary to make them work."[4]

A good feedback system from the output of EDP technology into all levels of the decision-making process will result in a "rifle" application versus the "shotgun" approach.

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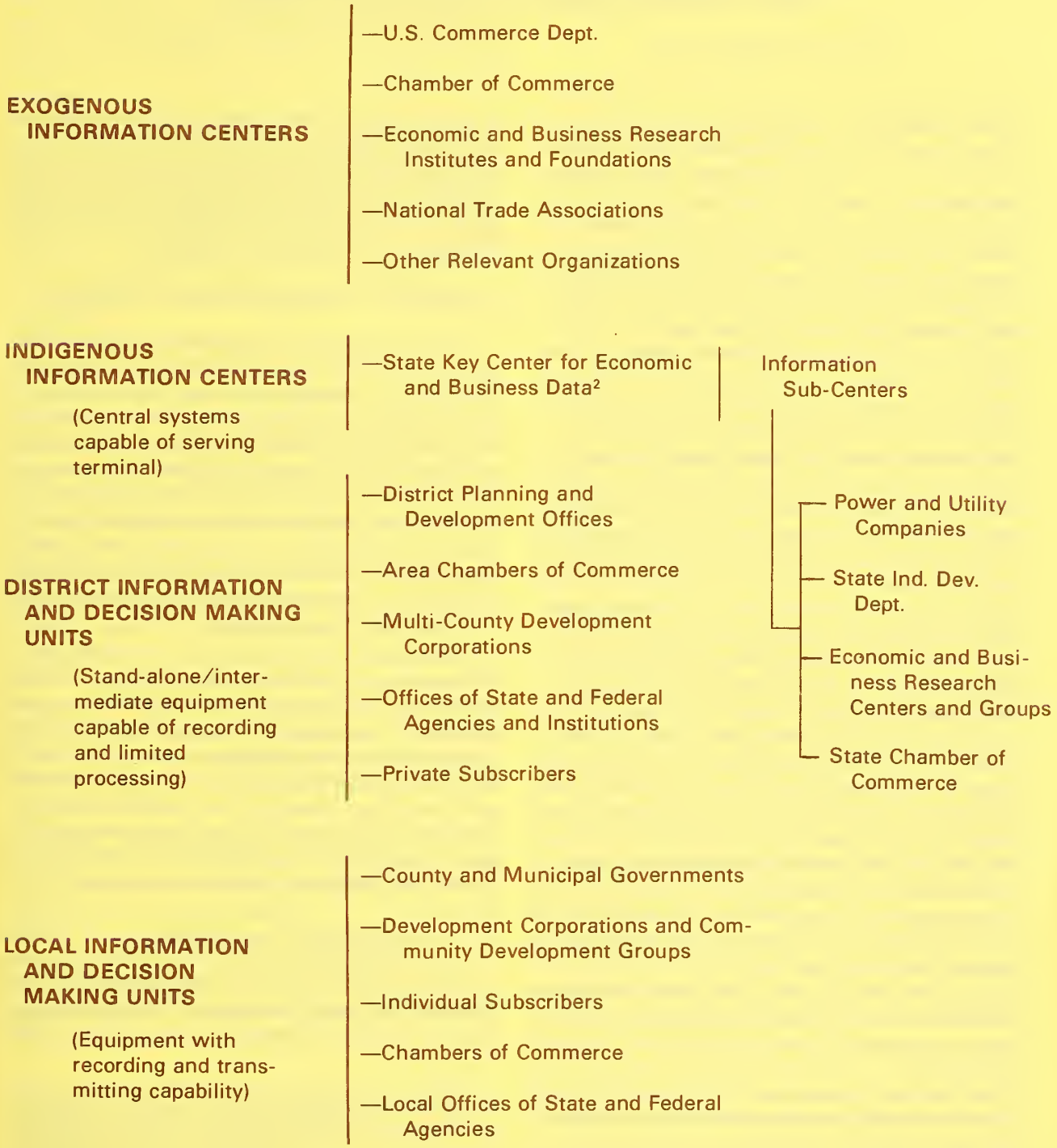
[2]*Charles C. Holt, "Basic Data for Public Decisions," The American Economic Review,* Vol. LX, May 1970, No. 2.

[3]Daniel Bell, Remarks of the Moderator in the Management of Information and Knowledge, Committee on Science and Astronautics, U.S. House of Representatives, 1970.

[4]*Ibid.,* p. 163.

FIGURE 1.—A STATE SYSTEM FOR ECONOMIC AND BUSINESS INFORMATION[1]


EXOGENOUS INFORMATION CENTERS
—U.S. Commerce Dept.
—Chamber of Commerce
—Economic and Business Research Institutes and Foundations
—National Trade Associations
—Other Relevant Organizations
INDIGENOUS INFORMATION CENTERS
(Central systems capable of serving terminal)
—State Key Center for Economic and Business Data[2]
Information Sub-Centers
Power and Utility Companies
State Ind. Dev. Dept.
Economic and Business Research Centers and Groups
State Chamber of Commerce
DISTRICT INFORMATION AND DECISION MAKING UNITS
(Stand-alone/intermediate equipment capable of recording and limited processing)
—District Planning and Development Offices
—Area Chambers of Commerce
—Multi-County Development Corporations
—Offices of State and Federal Agencies and Institutions
—Private Subscribers
LOCAL INFORMATION AND DECISION MAKING UNITS
(Equipment with recording and transmitting capability)
—County and Municipal Governments
—Development Corporations and Community Development Groups
—Individual Subscribers
—Chambers of Commerce
—Local Offices of State and Federal Agencies

[1]Systems may specialize in one or more bodies of data. For example, a State university may become the key information center for economic and business data and natural resources; the State employment agency given the responsibility for population; etc.

[2]The key centers for economic and business data can be linked to other key information centers to provide for integration of different bodies of data in problem analyses.

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ANALYZING NATURAL RESOURCES FOR COMMUNITY DEVELOPMENT

One difference between rural and urban development is that rural development is based primarily on natural resources, while urban development is based more on facilities and large numbers of people. Thus the experience of Federal agencies such as the Forest Service, the Bureau of Land Management, and the Bureau of Reclamation, that have primary land management responsibilities, can be useful to local development efforts. The EDP competency of their staff, their access to computers, and the availability of data on inputs and outputs of natural resources can provide important information.

McGeorge Bundy said that ecologists and economists have already demonstrated that model building and analysis can yield more penetrating insights than might come exclusively in the logic of lay observation or common sense. Computerized analytical systems which could compare the outputs from alternative management systems would make a significant contribution to rural development, especially in the Western states where public lands are a significant share of total land. The computer affords a means of using all information in comparing many alternatives for long-range plans. In fact, the glamour and mystery of computer analysis may have facilitated the inclusion of socioeconomic and political considerations in management policies of the Federal agencies that are heavily biologically oriented.

The use of computers for mapping land characteristics and ownership has contributed to rural development. Access to this material by planners has revolutionized the time involved. In Federal lands with intermingled private and public ownership, it has helped consolidate ownership into manageable size blocks and logical boundaries.

Data retrieval can be used in land use planning to help local decision makers order their priorities. New York, under the cooperative program between the New York State Office of Planning Coordinator and the Cornell University Center for Aerial Photographic Studies, has developed a computerized land use natural resource inventory system (LUNR). This system will help local planners and decision makers deal with problems of selecting sites, forming policies on land use and natural resources, and identifying problems.

Analytical Techniques and Models

A wide range of analytical techniques and models can be used in planning development. Selecting a technique with the right degree of sophistication and EDP requirement depends upon the extent to which the regional approach to public problem solving has been adopted, and thus, the varying complexity of the problems being studied. For example, in areas where no council of governments or regional planning and development organization exists, the emphasis may be on delineating a region simply on the basis of local land use planning and zoning.

There are different approaches. A less vigorous approach might use the functional economic area delineation procedures or central place concepts developed respectively by Fox and Berry.[5] A more formal analysis might use a variant of comparative cost analysis (location analysis) to determine the best location for specific economic activities. For land use planning, an economic base study coupled with projections of population growth and economic trends could be used.

Economic Base Studies

More mature regional development organizations will tend to focus on expanding job opportunities. An *economic base analysis* could

[5]Karl A. Fox and T. Krishma Kumar, "Delineating Functional Economic Areas," *Research and Education for Regional and Area Development,* Iowa State University Press, 1966, pp. 13-55, and Brian J.L. Berry, "Approaches to Regional Analysis—A Synthesis," *Annals,* Association of American Geographers, 54, 1964.

serve as the starting point to familiarize the specialist with the region and its potentials. Base analysis assumes that export industries are of primary importance. This might be appropriate in regions that are export oriented. Export industries might also be best for regions that have limited markets for domestically produced goods and services.

Economic base analysis also assumes that economic activity within a region is determined by outside forces—the export demands for products of the region. Basic industries that produce for a region's export market are defined. The regional economic base study identifies and measures the impact of these industries on economic activities in the region.

Charles M. Tiebout has suggested that economic base studies can: (1) describe sources of income and employment in a region, (2)pinpoint weaknesses in a region's economy, such as export employment being tied predominantly to one industry or to declining industries, (3) serve as a first step in forecasting regional economic growth, (4) help develop job opportunities over a long period, and (5) serve as an aid in planning land use, transportation, and governmental expenditures.[6]

Should electronic data processing be used for base studies? That depends on the size and complexity of the study. Compare the cost of preparing data in computer form, and writing programs for data processing, as against conventional data handling and collection. Computers can speed the process of data storage, manipulation, and retrieval in conducting base studies, although they are not essential.

Shortcomings of base studies have been noted by Paul W. Barkley and Thaine H. Allison, Jr. who stated, "empirical base studies appearing in the literature have not examined in any rigorous fashion the causes of growth. They have not asked why a particular industry is basic (exporting) and they have not asked under what circumstances other industries could become basic. In a word, base studies have presented discussion of the results of growth or estimated the likely results of potential growth, but have not come to grips with the essential questions of the causes of growth."[7]

Input-Output Analysis

In a region concerned with overall employment and income opportunities, an input-output analysis will show the interrelationships of all sectors of the region's economy.

Input-output analysis describes the quantitative interdependencies of an economy by use of a mathematical input-output model. The central concept of input-output analysis has been described by Wassily Leontief as "the ideal that there is a fundamental relationship between the value of the output of an industry and the size of the inputs going into it."[8]

The object of input-output analysis is to measure relationships among several sectors of a regional economy. Assuming reliable local data can be obtained, the input coefficients from such a study would specify which activities, when expanded, would contribute the most to the expansion of final output and employment in the region.

The most demanding aspect of input-output analysis is developing the input-output table itself. The problem is in correctly identifying the sectors of the regional economy. The investigator must understand the nature of regional economic activities and the relationships among sectors.

E.J. Battison and J. Dean Jansma have summarized the assumptions and limitations of input-output analysis, and have suggested its appropriate uses. They say that in view of all the assumptions connected with the different versions of input-output analystic models, it can be said that this analysis is not particularly concerned with longrun growth, especially when it is based on data for only one period. It does not try to predict economic activity of the firm or household. It is also inadequate for longrun growth analysis because it does not sufficiently encompass or explain all of the factors or changes. Instead it is a projective device that is useful primarily for short-term regional impact studies. It is more concerned with

[6]Charles M. Tiebout, *The Community Economic Base Study,* Supplementary Paper No. 16, Committee for Economic Development, New York, 1962, pp. 17-18.

[7]Paul W. Barkley and Thaine H. Allison, Jr., "Economic Base Studies in Resource Administration," *Land Economics,* 44(4) pp. 470-479.

[8]Wassily Leontief, *Input-Output Economics,* Oxford University Press, New York, 1966, p 22.

providing a framework for total flows or projecting the effect of an outside influence on the economy.[9]

A regional input-output analysis can alert regional personnel to the short-run needs for expansion of specific regional sectors such as local educational or service sectors, based on expected increases in final demand for other products of the region.

Locational Analysis

If a region's development is focused on industralization, then a location comparative cost analysis type of study, or perhaps a shift-share analysis, might be best. While geographic distribution of economic activity remains quite stable over time, changes do take place. These respond to changes in an industry's technology, in general technologies such as transportation, in market conditions (perhaps due to population shifts), or in raw material supply patterns. *Comparative cost studies* can determine the locational advantages of a region relative to the above factors.

If the analyst is concerned with the industrial growth prospects of a particular region, a series of such comparative cost studies is rather essential.[10]

Comparative Cost Studies

A comparative cost study requires extensive data on the costs of production and marketing. Data needed include: (1) transportation costs from the source of raw materials and to the markets for manufactured products, (2) labor availability, skill levels, and wage rates, (3) availability and costs of raw materials and other physical inputs, (4) the extent and location of markets for the product, and (5) the availability of capital goods. Computers can facilitate data storage, manipulation, and retrieval in making these analyses. They can quickly analyze cost data and indicate the lowest cost region for locating a new industrial plant.

Although comparative cost studies can be useful, they are of limited value in regional development. Two modifications or extensions of the location theory, however, can be useful for regional development. The more general extension is represented by the work of Karl Fox[11] in delineating functional economic areas and in the central place theory of Brian J.L. Berry.[12] These approaches focus on time and space effects of location of economic activity on the commuting time and distance people will travel to work and to purchase goods. They can identify communities which, with a given population and resource distribution, have the potential for becoming economic centers. In addition, these approaches suggest the types of economic development efforts that should be promoted in communities not desiring to become growth centers. Since each of these approaches requires gathering and processing data in each potential economic area, computer processing is most useful.

A second useful outgrowth of location theory is shift-share analysis. From periodic U.S. Department of Commerce data on employment and income generated in each county by industry, the changes in the type of employment and income can be calculated. One county or group of counties can easily be compared with other groups of counties, the State, or the Nation to see which employment categories led or lagged there, compared to other areas. This may show employment categories that might be profitably expanded. Such studies point up resource limitations, such as a shortage of specific occupational skills. This could alert public policy decision makers to the need for local resource development programs.

Linear Programming Models

EDP can be used with a regional linear programming model if an area is concerned with setting up a comprehensive multi-county development plan. This could provide projections of public infrastructure and investments necessary to provide a specified level of public services for a number of years in the future.

The linear programming technique is particularly suited to help decision makers solve any

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[9]E.J. Battison and J. Dean Jansma, *A Framework for Community Economic Planning Based on the Integration of an Input-Output Model and a Linear Programming Model,* Bulletin 757, Pennsylvania State University, June 1969.

[10]Walter Isard, "Methods of Regional Analysis," *An Introduction to Regional Science,* M.I.T. Press, Cambridge, Massachusetts, 1960, p 233.

[11]Karl Fox, *Op. Cit.*

[12]Brian J.L. Berry, *Op. Cit.*

problem that has: (1) an objective, (2) alternative methods for reaching the objective, and (3) some resource restriction.

With the linear programming technique the user can select the maximum or minimum values of specific numerical functions, and incorporate vast quantities of data. The parametric features of the better programming models are ideal for assigning multiple output values. This characteristic is good for considering fluctuating prices of resources. The parametric model allows investigators to assign various prices to the inputs and outputs for comparison. Some models even provide a sensitivity analysis to show how much the value of different variables can fluctuate without affecting the optimum solution. The recursive feature of some linear programs is well suited to predicting the outcome of long range plans and can involve annual iterations.

However, the linear programming model, and the solution it gives, are only as reliable as the inputs into the program. The planner must understand both the economic principles and the engineering or production principles involved. He must specify realistic resource restrictions, obtain or develop accurate input coefficients, and carefully identify relevant prices in the resource requirements. The usefulness of the results depends directly upon these inputs.

Simulation Models

A technique that appears to have promise in development is simulation. Simulation is a technique that tries to duplicate and predict a pattern of events as observed in the real world. In development, a simulation model might be used to produce a time series of estimates of important variables in the local economy. A rather simple model might simulate variables such as population, income, investment, and employment in a local community. As more information is needed, other social, economic or demographic variables could be developed and included. Once developed for a particular area, such a model could be useful to a planner or local officials since many alternative decisions could be tested by simulation to determine the consequences. Simulation trials are easy and inexpensive.

A simulation model was applied to the Susquehanna River Basin to define the role that the basin's water resources would or could play in development. The model included three major sections—demographic, export employment, and water. After more than 200 simulation runs made with this model, the researchers concluded that the results were more useful where the economic and demographic sectors were linked.

One model simulates social accounting of areas and regions. This is built around an input-output model. By assuming a given population and resultant aggregate demand, output estimates by sector within the economy can be determined. After the output is determined, the total employment, wages and salary employment, income, and other economic variables can be determined. This information is useful in evaluating economic alternatives.

Few, if any, simulation models have been developed for a community, a county, or a small multi-county area. Most have been developed for States or large multi-county regions. All of these models have one thing in common—large development costs. Hamilton stated that "model building and effort requires much thought and planning . . . crash model building programs are not likely to be successful.[13]

If local decision makers were involved in developing a simulation model to determine the important factors and relationships for their area, their understanding of the area's economic situation would improve, as would their ability to make decisions, even if the model were never run. This would solve one major problem—getting information from the computer to decision makers in a form understandable and useful to them.

Perhaps the most serious limitation in applying models to local areas is that they cannot supply all of the important information needed by local decision makers. Many outside factors affect the economic development of a small area. Thus, even if a good simulation model could predict how the area would respond to changes in economic structure, it could not predict events outside the area.Local officials may have little influence on important development events that may happen within their areas.

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[13]H.R. Hamilton; S.C. Goldstone; J.W. Milliman; A.L. Pugh, III; E.B. Roberts; A. Zellner; *Systems Simulation for Regional Analysis—An Application to River Basin Planning,* M.I.T. Press, 1969.

Use of computer models is often limited by lack of data—sometimes because data have not been developed, or are not available in usable form, or are too expensive to assemble for computer usage. Statistical data collecting and reporting systems are often geared to precomputer technology and operate separately from other related systems.

Most decisions made at the local level are made in the absence of a complete analysis of the potential development or its impact upon other facilities. For instance, a decision might be made to expand water supply for industry or residential development. After the capacity is expanded, the sewage plant cannot handle the added load. Thus the expansion of the sewage facility becomes unplanned expenditure.

Tie In With Existing Systems

By tying in with existing data systems, a community may be able to minimize its need for both hardware and software. For example, the "Qwick Qwery" system developed by the Economic Development Administration has a file that includes data on county census, business patterns, agricultural census, and construction data. There are similar files for cities and Standard Metropolitan Statistical Areas.

The Qwick Qwery retrieval program is flexible and easy to use. Three simple forms are needed to extract information from the system. Persons with limited experience with computer programming can learn Qwick Qwery programming in a 2-day course.

The Qwick Qwery system has the capacity to:

1. Extract and print out by counties any attributes selected
2. Select counties with specific characteristics
3. Rank counties by size of any attribute
4. Compute standard statistics, maximum observation, minimum observation, grand totals, means and standard deviations of attribute selected
5. Create new attributes; new attributes can be created if they are a function of stored attributes or constants
6. Create a report format; the user can design a printout that will display the selected attributes in a way convenient to the analyst
7. Extract from tapes; information can be obtained on a tape which can then be used as input for further analysis
8. Extract subset files; a tape file containing only selected subsets of either counties or attributes can be obtained
9. New data can be added easily.

With this information as the basic input it may be possible to tie in with some existing commercial EDP firm or to encourage the development of a new commercial organization to handle the local needs for development. Several States, including Minnesota and West Virginia, have adapted systems based on the Qwick Qwery data to back State and local planning efforts.

Computer Centers

Some EDP services can be profitably performed for sparsely populated areas while others need urban areas to be economically feasible. Computer hardware does not need to be installed in rural areas to bring access to computer services. All that is necessary is a contact agent and the means to transmit input and output data to a computer center. It is possible to contract data input preparation on a per entry charge basis, to lease programs on a royalty basis, and to purchase access computers on a time-sharing basis. Commercial EDP access can be available without having to tie up hundreds of thousands of dollars in computer hardware and software.

A Larger Community System

Although EDP services are available to rural areas via computer facilities outside of the area, the greatest benefits to the community may result from a locally owned operation. Any development area with an urban center of around 10,000 population, which serves a trading area of perhaps another 10,000 people, could profitably support a small or medium sized computer installation.

One of the early activities in the development effort might be to encourage establishment of a new computing service or a branch agency of an existing one in a nearby metropolitan area. The "on site" capability could help efforts to apply EDP to development. Such a firm could provide such basic services as handling accounts receivable, billing statements, cash income tax service, and a general

accounting program. It could handle payrolls and check writing, inventory control, and management accounting for farmers, businessmen, and public enterprises such as the local hospital. It should also be possible to computerize many of the county government functions such as general accounting, tax rolls, school bus routing, and determining size and location of roads and health service facilities.

A new firm must start where the local residents are, in knowledge, attitudes, and resources. Its success depends on ability to deliver as promised and in providing only services wanted. New applications will develop as people in the area become more familiar with EDP and what it can do for them.

Commercial Facilities

Commercial EDP can help create a local climate in which modern management methods can be understood and practiced. It can provide the focal point of economic activities in the area. It can improve public services by improving the basis for decision making.

Local decision makers, particularly elected officials, often lack financial data to assist in budgeting and deciding on alternatives.

Examples of Community EDP Systems

Two programs have been tested using computers for local government accounting that help meet the financial decision making needs of local officials. These are the ELFAC Program developed by the New England States and the Towns EDP Program developed in Oregon by the Northeastern Oregon Towns and Small Cities Program (TASC). These are accounting programs where monthly records are submitted and monthly printouts are sent to users. Receipts and expenditures are recorded and a balance sheet showing each month's activities and a balance against the annual budget is shown. This helps local officials determine how realistic their budgeting procedures are and helps to strengthen each ensuing year's financial planning.

Such systems have been used in farm and business management for years and are adaptable, inexpensive, and useful in local government financial work.

It is not likely that many areas will develop elaborate systems such as that in Alameda County, California, which has about 200 separate computer programs, 50 systems analysts and programmers, 30 computer operators, and 60 keypunch operators, requiring an annual budget of $2.3 million. This does not mean that they should be without the basic services of EDP. While it is doubtful that many government units involved in development should own their own computer or have their own programmers, they can be associated with a system with hardware and software capable of handling their problems. Such access is most feasible through a commercial EDP operation with the technical competency to make electronic data processing work for the community.

SUMMARY

The declining population in many small towns and rural areas has prompted local leaders to study alternative solutions for the survival of their communities. These communities need to acquire additional resources or find the best combination of resources that will make them competitive for development. Most smaller communities do not have the resources—capital, human, and natural—to support a substantial rate of growth. Their resources must be combined within the community or with a larger multi-county development area.

Since development comes from actions by various groups of people, private entrepreneurs, and public officials, these must be coordinated in making decisions.

Leaders must examine existing resources and set goals for area development. Obtaining good information on local resources is difficult, but EDP can help. The potential for computer applications to development seems almost unlimited. The ability to process, store, retrieve and format immense quantities of data at high speed and accurately, extends man's ability to consider many factors in planning. Access to computers can bring to rural America some of the variety and quality of services now available only in large cities.

But the computer is merely a tool. It is not a mechanical Moses capable of delivering man from the responsibility of making choices. Its uses and effectiveness depend on the resources, desires, and skills of the user.

Effective use in development "demands education and training at various levels, ranging through that of the policy maker, the manager of the computer center, and the specialists. Above all, there must be people at the highest level of government who understand the possibilities and limitations of computers for development and can make decisions concerning them . . . . It is essential to make those responsible for planning and decision making aware of the sound, economic possibilities of the computer."[14] There is some evidence that the incentive to use EDP has not been as great in management of public business as it has in the management of private firms. Computer technology is apparently underutilized and public agencies are devoting limited manpower to developing and applying it.

Much information is available by political subdivisions, census tracts, or similar units that may not be compatible to the decision making unit. The lack of uniformity among political jurisdictions makes it difficult to compile comparable data for each decision making area.

Use of modern data processing techniques in development can help bring better information into decision making. Planning programs can be integrated with other programs such as billing, data collection, statistical reporting, and budgeting to minimize duplicated efforts. Most communities will be in a better position if they have access to large, relatively efficient computers and to centralized programming, planning, and analysis personnel.

The community decision maker must beware of consultants who offer standard solutions that may be appropriate for large metropolitan areas but not for smaller communities. Where techniques are designed to fit particular problems, community leaders can make them a part of the ongoing planning process and help reduce crisis-oriented decisions.

The cost of data collection sometimes discourages application of development models. Lack of hardware and software expertise has been discouraging. A system with the following organization might prove to be most effective in development:

(1) National systems such as Qwick Qwery should be well known and accessible to systems at all other levels.

(2) Regional centers designed to take advantage of the national system, but with added inputs, could be developed. Access to the regional systems should be available to all units below them in the organizational hierarchy.

(3) State units with access to the national and regional units should be developed, probably

[14] *The Application of Computer Technology For Development*, Report of the Secretary General, United Nations Economic and Social Council, May 20, 1970, p. 16.

oriented around the hardware capabilities of the State universities. A coordinated planning staff representing the State agencies, multi-county development units, and a State Land-grant university should cooperate in developing programs.

Development areas would be satellite units to the larger systems. Most of these local units would not own much equipment or have an extensive programming staff. They would rather depend upon the expertise of consultants, either private or public, such as Cooperative Extension Service personnel, to help them with their problems, paying only for time.

The ownership of hardware and software at any of these levels could be public or private or both. Some of the most vigorous computer industries have developed around a joint effort by universities and commercial firms. While a local computer business will contribute more to the economic base of the community than a non-resident firm, the limitations of hardware and software capability might diminish its usefulness. Time-sharing access to larger centers could overcome this limitation.

One of the greatest advances in improving the usefulness of any system would be uniform data input at all levels throughout the country. This would make the aggregation of subsets from the various levels much easier and more meaningful. Any system assisted by public funds should provide common data inputs.

While the United States Department of Agriculture and the Land-grant universities have furnished leadership in applying EDP to farm management, no comparable commitment has been made for rural development. Such a commitment at all levels would be appropriate.

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